

**Listing of the Claims:**

1. (currently amended) A method of forming a powder metal material comprising:
  - molding a ~~low-alloy iron-containing~~ powder metal composition into a compact;
  - sintering the compact to provide a sintered compact;
  - peening at least a portion of a surface of the sintered compact to densify the at least a portion of the surface; and
  - sizing the sintered compact after peening to densify at least a portion of a core region of the sintered compact and provide a sized compact;  
at least one of (i) quenching and tempering the sized compact and (ii) carburizing the sized compact; and  
at least one of shot peening, surface rolling, and honing at least a portion of a surface of the sized compact to introduce compressive stresses into the at least a portion of the surface.
2. (cancelled)
3. (previously presented) The method of claim 1 wherein the powder metal composition comprises iron and at least one alloying element chosen from nickel, molybdenum, chromium, manganese, copper, and phosphorus.
4. (previously presented) The method of claim 1 wherein the powder metal composition is an iron-base powder metal material having a sintered carbon content ranging from 0.02 weight percent to 0.6 weight percent.
5. (currently amended) The method of claim 1 wherein peening the sintered compact comprises at least one of shot peening and laser peening.

6. (currently amended) The method of claim 1 wherein peening at least a portion of a surface of the sintered compact comprises shot peening at least a portion of the surface of the sintered compact to densify the at least a portion of the at least one surface after sintering, ~~at least a portion of the surface of the sintered compact is shot peened to densify the at least a portion of the at least one surface.~~

7. (original) The method of claim 6 wherein shot peening the at least a portion of the surface of the sintered compact comprises impacting the at least a portion of at least one surface with shot having a diameter ranging from 0.005 inches to 0.331 inches.

8. (original) The method of claim 6 wherein shot peening the at least a portion of the surface of the sintered compact comprises impacting the at least a portion of at least one surface with shot having a diameter ranging from 0.014 inches to 0.046 inches.

9. (original) The method of claim 6 wherein shot peening the at least a portion of the surface of the sintered compact comprises impacting the at least a portion of at least one surface with shot for a shot time ranging from 5 minutes to 45 minutes.

10. (currently amended) The method of claim 6 wherein immediately after shot peening the at least a portion of the surface of the sintered compact, the at least a portion of the surface of the sintered compact that was shot peened is uniformly densified to a density of at least 98 percent of a theoretical density of the powder metal material to a depth ranging from 0.001 inches to 0.040 inches.

11. (currently amended) The method of claim 6 wherein immediately after shot peening the at least a portion of the surface of the sintered compact, the at least a portion of the surface of the sintered compact that was shot peened is uniformly densified to a density of at least 98 percent of a theoretical density of the powder metal material to a depth of at least 0.002 inches.

12. (currently amended) The method of claim 6 wherein immediately after shot peening the at least a portion of the surface of the sintered compact, the at least a portion of the surface of the sintered compact that was shot peened is uniformly densified to a density of at least 98 percent of a theoretical density of the powder metal material to a depth of at least 0.005 inches.

13. (currently amended) The method of claim 6 wherein immediately after shot peening the at least a portion of the surface of the sintered compact, the at least a portion of the surface of the sintered compact that was shot peened is uniformly densified to a density of at least 98 percent of a theoretical density of the powder metal material to a depth of at least 0.010 inches.

14. (currently amended) The method of claim 6 wherein immediately after shot peening the at least a portion of the surface of the sintered compact, the at least a portion of the surface of the sintered compact that was shot peened is uniformly densified to full density to a depth ranging from 0.001 inches to 0.040 inches.

15. (original) The method of claim 1 wherein after sizing, the at least a portion of the core region of the compact has a density of at least 92 percent of a theoretical density of the powder metal material.

16. (original) The method of claim 1 further comprising pre-sintering the compact after molding and prior to sintering.

17-18. (cancelled)

18. (currently amended) The method of claim 1 further comprising plating at least a portion of the surface that was densified after sizing the sintered compact.

20-39. (cancelled)

40. (currently amended) A method of forming a powder metal part comprising:  
molding ~~a low-alloy~~ an iron-containing powder metal composition into a green part comprising at least one tooth having a root region and a flank region;  
sintering the green part to provide a sintered part;  
subsequent to sintering the green part, shot peening at least a portion of a surface of the sintered part in at least one of the tooth root region and the tooth flank region to densify the at least a portion of the surface;  
and  
sizing the part after shot peening to densify at least a portion of a core region of the part and provide a sized part;  
at least one of (i) quenching and tempering the sized part and (ii) carburizing the sized part; and  
at least one of shot peening, surface rolling, and honing at least a portion of a surface the sized part to introduce compressive stresses into the at least a portion of the surface of the part.

41. (original) The method of claim 40 wherein the part is chosen from a gear and a sprocket.

42. (currently amended) The method of claim 40 wherein immediately after shot peening the at least a portion of a surface of the sintered part, the at least a portion of the surface of the sintered part that was shot peened is uniformly densified to a density of at least 98 percent of a theoretical density of the powder metal part to a depth ranging from 0.001 inches to 0.040 inches.

43. (currently amended) The method of claim 40 wherein immediately after shot peening the at least a portion of a surface of the sintered part, the at least a portion of the surface of the sintered part that was shot peened is uniformly densified to a density of at least 98 percent of a theoretical density of the powder metal part to a depth of at least 0.002 inches.

44. (currently amended) The method of claim 40 wherein immediately after shot peening the at least a portion of a surface of the sintered part, the at least a portion of the surface of the sintered part that was shot peened is uniformly densified to a density of at least 98 percent of a theoretical density of the powder metal part to a depth of at least 0.005 inches.

45. (currently amended) The method of claim 40 wherein immediately after shot peening the at least a portion of a surface of the sintered part, the at least a portion of the surface of the sintered part that was shot peened is uniformly densified to a density of at least 98 percent of a theoretical density of the powder metal part to a depth of at least 0.010 inches.

46. (currently amended) The method of claim 40 wherein immediately after shot peening the at least a portion of a surface of the sintered part, the at least a portion of the surface of the sintered part that was shot peened is uniformly densified to full density to a depth ranging from 0.001 inches to 0.040 inches.

47. (original) The method of claim 40 wherein after sizing, the at least a portion of the core region has a density of at least 92 percent of a theoretical density of the powder metal part.

48. (original) The method of claim 40 further comprising pre-sintering the part after molding and prior to sintering.

49-50. (cancelled)

51. (currently amended) A method of forming a powder metal part comprising:  
molding ~~a low-alloy~~ an iron-base powder metal composition into a part  
comprising at least one tooth having a root region and a flank region;  
sintering the green part to provide a sintered part;  
subsequent to sintering the green part, shot peening at least a portion of a  
surface of the sintered part in at least one of the tooth root region and  
the tooth flank region to densify the at least a portion of the surface;  
and  
forging the part to densify at least a portion of a core region of the part and  
provide a forged part;  
at least one of (i) quenching and tempering the forged part and (ii)  
carburizing the forged part; and  
at least one of shot peening, surface rolling, and honing at least a portion  
of the surface the forged part to introduce compressive stresses into  
the at least a portion of the surface.

52. (original) The method of claim 51 wherein the part is selected from the group consisting of a gear and a sprocket.

53. (currently amended) The method of claim 51 wherein immediately after shot peening the at least a portion of a surface of the sintered part, the at least a portion of the surface of the sintered part that was shot peened has a density of at least 98 percent of a theoretical density of the powder metal part.

54. (currently amended) The method of claim 51 wherein immediately after shot peening the at least a portion of a surface of the sintered part, the at least a portion of the surface of the sintered part that was shot peened is fully dense.

55. (currently amended) The method of claim 51 wherein immediately after shot peening the at least a portion of a surface of the sintered part, the at least a portion of the surface of the sintered part that was shot peened is uniformly densified to a density of at least 98 percent of a theoretical density of the powder metal part to a depth ranging from 0.001 inches to 0.040 inches.

56. (currently amended) The method of claim 51 wherein immediately after shot peening the at least a portion of a surface of the sintered part, the at least a portion of the surface of the sintered part that was shot peened is uniformly densified to a density of at least 98 percent of a theoretical density of the powder metal part to a depth of at least 0.002 inches.

57. (currently amended) The method of claim 51 wherein immediately after shot peening the at least a portion of a surface of the sintered part, the at least a portion of the surface of the sintered part that was shot peened is uniformly densified to a density of at least 98 percent of a theoretical density of the powder metal part to a depth of at least 0.005 inches.

58. (currently amended) The method of claim 51 wherein immediately after shot peening the at least a portion of a surface of the sintered part, the at least a portion of the surface of the sintered part that was shot peened is uniformly

densified to a density of at least 98 percent of a theoretical density of the powder metal part to a depth of at least 0.010 inches.

59. (currently amended) The method of claim 51 wherein immediately after shot peening the at least a portion of a surface of the sintered part, the at least a portion of the surface of the sintered part that was shot peened is uniformly densified to full density to a depth ranging from 0.001 inches to 0.040 inches.

60. (original) The method of claim 51 wherein after forging, the at least a portion of the surface of the part that was shot peened is essentially free of finger oxides.

61. (original) The method of claim 51 wherein after forging, the at least a portion of the core region of the part has a density of at least 98 percent of a theoretical density of the powder metal part.

62. (original) The method of claim 51 wherein after forging, both the surface and the core region of the iron-base powder metal part have full density.

63. (original) The method of claim 51 further comprising pre-sintering the compact after molding and prior to sintering.

64-100. (cancelled)

101. (previously presented) A method of forming a powder metal material comprising:

molding a powder metal composition into a compact;  
sintering the compact;

at least one of peening and surface rolling at least a portion of a surface of the compact after sintering to densify the at least a portion of the surface;

sizing the compact after shot peening to densify at least a portion of a core region of the compact;

at least one of (i) quenching and tempering the compact after sizing and (ii) carburizing the compact after sizing; and

at least one of shot peening, surface rolling, and honing at least a portion of a surface of the compact, thereby introducing compressive stresses into the at least a portion of the surface of the compact, after sizing the compact.

102. (previously presented) A method of forming a powder metal material comprising:

molding a powder metal composition into a compact;

sintering the compact;

at least one of peening and surface rolling at least a portion of the surface of the compact after sintering to densify the at least a portion of the surface;

forging the compact to densify at least a portion of a core region of the compact;

at least one of (i) quenching and tempering the compact after forging and (ii) carburizing the compact after forging; and

at least one of shot peening, surface rolling, and honing at least a portion of a surface of the compact, thereby introducing compressive stresses into the at least a portion of the surface of the compact.

103. (currently amended) The method of claim 102, wherein the powder metal composition is ~~a low-alloy~~ an iron-containing powder metal composition.

104. (previously presented) A method of forming a powder metal part comprising:

- molding a powder metal composition into a green part comprising at least one tooth having a root region and a flank region;

- sintering the green part;

- subsequent to sintering the green part, shot peening at least a portion of a surface of the part in at least one of the tooth region and the tooth flank region to densify the at least a portion of the surface;

- forging the part to densify at least a portion of a core region of the part;

- at least one of (i) quenching and tempering the part after forging and (ii) carburizing the part after forging; and

- at least one of shot peening, surface rolling, and honing at least a portion of a surface of the part, thereby introducing compressive stresses into the at least a portion of the surface of the part.